

# PATENT SPECIFICATION

NO DRAWINGS

915,389



Date of Application and filing Complete Specification June 12, 1961.

No. 21152/61.

Application made in Denmark (No. 2328) on June 16, 1960.

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## COMPLETE SPECIFICATION

### Process for Producing Air-containing Fat-free Edible Ice-cream

#### ERRATUM

SPECIFICATION No. 915,389  
Amendment No. 1

Page 1, lines 19/20, for "thereform" read  
"therefore"

THE PATENT OFFICE  
9th November 1965

to 150%.  
25 These properties have hitherto generally  
been obtainable only in fat containing ice  
cream products, especially in those having  
a high fat content. However, a high fat  
content is not always desirable as, for  
30 example, certain flavours, for example fruit  
flavours, are more pronounced when the ice  
cream has either a low fat content or else  
contains no fat at all. Accordingly, ice  
cream mixes of low fat contents have been  
35 produced, such as sherbet mixes. How-  
ever, the rapid freezing and prolonged cold  
storage which is generally involved in the  
commercial production of ice cream products  
for distribution cannot be applied to sherbet  
40 mixes without spoiling the texture of the  
sherbet ice cream product as ice particles  
will form within it. Therefore sherbet ice  
cream products are generally only produced  
for local, immediate consumption, for  
45 example in homes and restaurants.

is generally produced by freezing a juice  
containing glucose and cane sugar as well as  
a thickening agent such as gelatine, carboxy-  
methylcellulose or an alginate directly into  
a mould of the shape required.

The present invention relates to a pro-  
cess for producing a fat free edible ice  
which contains finely dispersed air or gas  
in proportions which are similar to those  
contained in the above mentioned fat con-  
taining ice cream, and which has a similar  
light, soft and smooth consistency, so that  
it can be bitten into and easily cut even  
in a comparatively cold state.

The process for the production of an air  
containing fat free edible ice according to  
the invention comprises freezing a juice con-  
sisting of water, flavouring, sugar, a stabilizer  
and fat free and casein-free milk-protein  
and/or egg white in an ice cream freezer  
or a like apparatus adapted to introduce air  
into the mixture during freezing.

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## COMPLETE SPECIFICATION

### Process for Producing Air-containing Fat-free Edible Ice-cream

We, AKTIESELSKABET GRINDSTEDVAERKET, a Danish Company, of 30, Vestre Kongevej, Arhus (Viby) Denmark, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

During the production of an ice cream product from an ice cream mix it is generally desirable to introduce air in finely dispersed form into the mix, this resulting in an increase in volume, termed the over-run, of the mix. The result is to give the frozen ice cream product a light, soft and at the same time smooth consistency, and also to counteract the tendency of the mix during cold storage to form large crystals. The ice cream product is therefore pleasant to bite into and may easily be cut, as by a knife or with the edge of a spoon, even when very cold. The generally preferred value for the over-run is 40 to 150%.

These properties have hitherto generally been obtainable only in fat containing ice cream products, especially in those having a high fat content. However, a high fat content is not always desirable as, for example, certain flavours, for example fruit flavours, are more pronounced when the ice cream has either a low fat content or else contains no fat at all. Accordingly, ice cream mixes of low fat contents have been produced, such as sherbet mixes. However, the rapid freezing and prolonged cold storage which is generally involved in the commercial production of ice cream products for distribution cannot be applied to sherbet mixes without spoiling the texture of the sherbet ice cream product as ice particles will form within it. Therefore sherbet ice cream products are generally only produced for local, immediate consumption, for example in homes and restaurants.

Wholly fat free ice cream products, the so called edible ice, containing an amount of dissolved carbon dioxide have been produced. However, even when they are of the best quality and eaten immediately upon production they are gritty in character. When produced and distributed commercially they are generally hard and may only be consumed by licking. This is because edible water ice contains no or practically no emulsified air and so the mix hardens into a compact body of ice in which the ice crystals are only scantily separated from each other by frozen sugar and colloids. No attempt is usually made to introduce air into the mix during their production by using an ice cream freezer for freezing. Even if air is introduced, it is usually only possible to obtain a product containing coarse, badly interspaced air bubbles and to obtain an over-run of 10 to 15%, this being insufficient to obtain a substantial improvement in the consistency of the product. Such water ice is generally produced by freezing a juice containing glucose and cane sugar as well as a thickening agent such as gelatine, carboxymethylcellulose or an alginate directly into a mould of the shape required.

The present invention relates to a process for producing a fat free edible ice which contains finely dispersed air or gas in proportions which are similar to those contained in the above mentioned fat containing ice cream, and which has a similar light, soft and smooth consistency, so that it can be bitten into and easily cut even in a comparatively cold state.

The process for the production of an air containing fat free edible ice according to the invention comprises freezing a juice consisting of water, flavouring, sugar, a stabilizer and fat free and casein-free milk-protein and/or egg white in an ice cream freezer or a like apparatus adapted to introduce air into the mixture during freezing.

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It has been found that as a result of the inclusion of fat free and casein-free milk-protein and/or egg white the juice is able to absorb air during freezing in an ice cream freezer or like apparatus in the same way as fatty ice creams absorb air. In the process of the invention, the juice swells during freezing due to introduction of the air and an over-run of 50% or more may be obtained. The air is absorbed in finely dispersed form and the ice produced has the above mentioned desirable characteristics.

In one process according to the invention the milk-protein which is used consists mainly or entirely of milk-albumin.

The milk-protein is preferably used according to the invention in an amount greater than 0.05% and usually not greater than 0.5%, the preferred range being from 0.1 to 0.5% and, more preferably, from 0.1 to 0.2%.

Among the known stabilizers it has been found that gelatine and the like nitrogen-containing stabilizers can only with difficulty be brought to give the desired results, the resultant viscosity being too low in a juice of the kind concerned when using such stabilizers while the juice is being stirred, although the juice may gelatinize in a suitable manner when the stirring is stopped. Consequently according to the invention it is preferable to use as stabilizers a nitrogen-free polyhydroxycompound related to the carbohydrates, such as pectin, an alginate or carboxymethyl cellulose.

It is further advantageous according to the invention to incorporate with the juice a small amount of mono-calcium phosphate, in order to shorten the gel resulting from such stabilizers.

If, in place of milk-protein, egg-white is used in the juice, this should also be used in small amounts, i.e. when calculated on a dry matter basis, the same proportion should be used as when using milk-protein.

#### EXAMPLE 1

In a sugar- and juice-containing aqueous solution containing for instance 200 g. cane sugar, 30 g. glucose and 200 g. unconcentrated fruit juice per litre is dissolved:—

- 0.4% pectin
- 0.4% sodium alginate
- 0.15% milk-albumen
- 0.1% monocalcium phosphate.

The solution is cooled and poured into an ice-cream-freezer, in which it is swollen and frozen. The frozen mixture is swollen to an over-run of 75% and is emptied into a container and poured from this into moulds

or containers in the ordinary way, is quickly cooled and then placed in the hardening-room. A product is obtained, which, as to consistency, resembles fat-containing ice-cream, but has the same taste as a pure-water-ice, without being gritty or hard as is usually the case.

#### EXAMPLE 2

As Example 1, but instead of 0.4% sodium alginate, 0.2% sodium alginate and 0.3% sodium carboxymethylcellulose are used.

#### EXAMPLE 3

As Example 1, but the admixture of milk-albumen is increased to 0.2% and the alginate-admixture is reduced to 0.3%. Furthermore the ratios between sugar and glucose are altered from 200:30 to 150:100, whereby the product will be less sweet, but this may be compensated for by the use of sweet fruit juices.

#### EXAMPLE 4

As Example 3, but with a further admixture of 0.2% locust gum, whereby the stability of the swelled mixture is somewhat increased.

#### WHAT WE CLAIM IS:—

1. A process for the production of an air-containing fat-free edible ice which comprises freezing a juice consisting of water, flavouring, sugar, a stabilizer and fat-free and casein-free milk protein and/or egg-white in an ice-cream-freezer or a like apparatus adapted to introduce air into the mixture during freezing.
2. A process as claimed in Claim 1, in which the milk protein is milk albumen.
3. A process as claimed in Claim 1 or 2, in which the amount of milk protein or egg-white on a dry weight basis is from 0.05 to 0.5 per cent by weight of the total mixture.
4. A process as claimed in Claim 3, in which the amount of milk protein or egg-white on a dry weight basis is from 0.1 to 0.2 per cent by weight of the total mixture.
5. A process as claimed in any preceding claim in which the stabilizer is a nitrogen-free carbohydrate, such as pectin, an alginate or carboxymethyl cellulose.
6. A process as claimed in any preceding claim in which the mixture also contains mono-calcium phosphate.
7. A process for the production of an air-containing fat-free edible ice substantially as described herein with reference to any of the examples.

8. An air-containing fat-free edible ice  
whenever produced by a process as claimed  
in any preceding claim.

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